INTEX-NA Flight 11: July 22, 2004

This was the third DC-8 science flight from Pease AFB New Hampshire. The flight was focused on sampling polluted boundary layer outflow along the eastern seaboard both to the north and south of Pease. In the free troposphere, outflow was expected to be comprised of a mixture of influences including biomass burning, Asian influence, and stratospheric influence. Objectives for this flight also included the initial opportunity for intercomparison between the NASA DC-8 and NOAA WP-3D aircraft. A coordinated validation profile was also planned with the J-31 over the NOAA research vessel Ron Brown and beneath the MISR instrument on NASA's Terra satellite. Total flight duration was 9 hours with an 8:00 am takeoff. Basic flight patterns and their location are shown in the slides below. The northernmost point of the flight was not reached due to airspace difficulties and the return leg was shifted slightly west of the planned route.

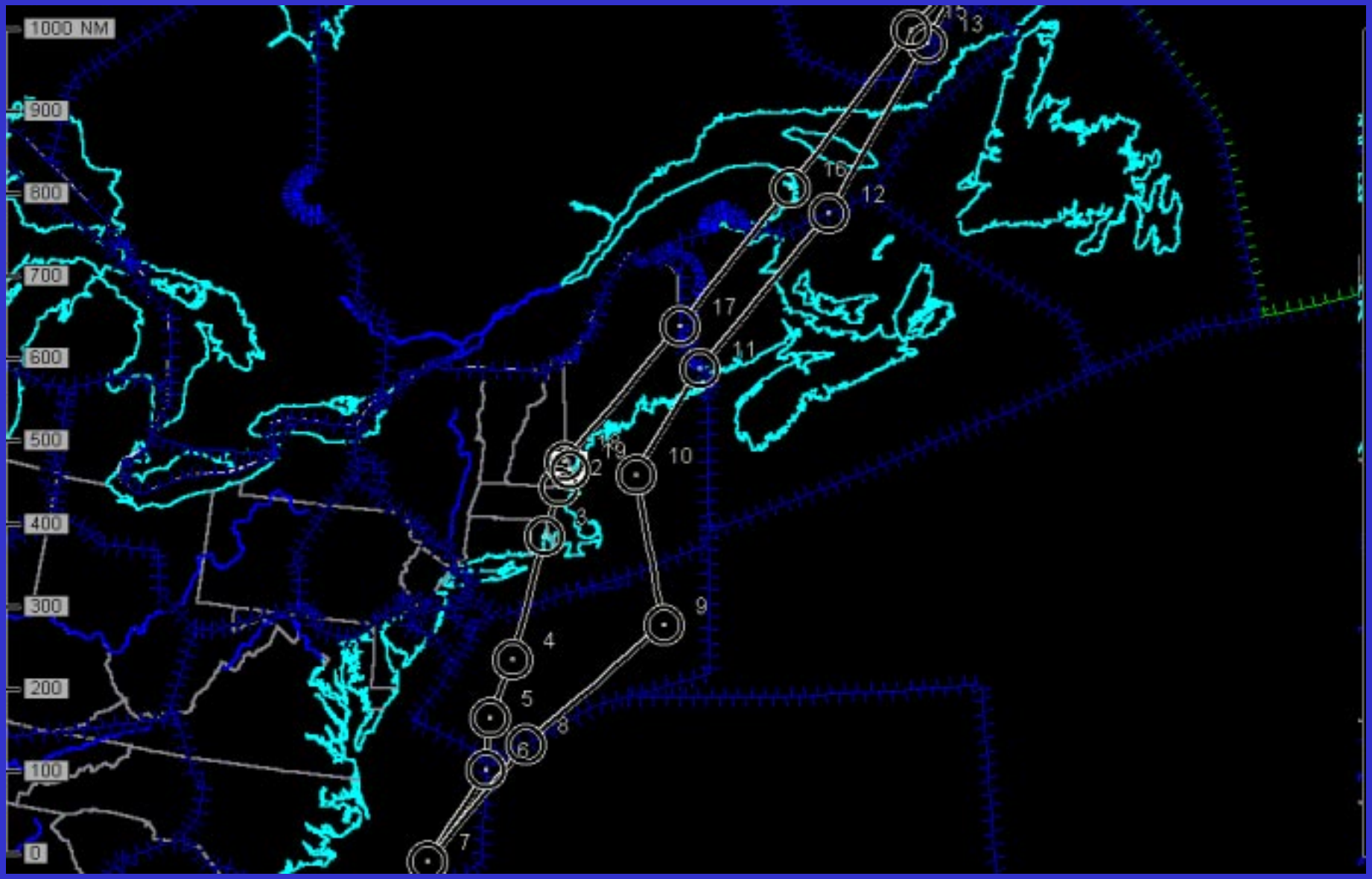
The flight was sandwiched between two surface weather systems. A diffuse frontal boundary extended north to south several hundred miles east of the Atlantic Coast. Widespread cloudiness and scattered thunderstorms were associated with this boundary, assisted by weak cyclogenesis that was occurring along its northern periphery. The second system was an advancing front that was anchored to a relatively strong low east of Hudson Bay and extending over the Great Lakes and into Kansas. Cloudiness and thunderstorms also were associated with this system. The flow aloft was slightly less amplified than during previous flights. The closed low off the East Coast was weaker than before. However, an advancing short wave was propagating eastward in association with the frontal system to the west. Strong anticyclonic flow continued along the western half of the United States. Winds over the southern part of the flight were rotating counterclockwise around the offshore low, i.e., from the north over the western part of the southern leg, and from the south on the eastern part of that leg. Farther north, winds were from the southwest at all altitudes. The jet stream was located farther north than during previous flights. Even the northern most part of the flight was still south of the main core of the jet.

As expected, high ozone (~100 ppbv) was encountered on the initial leg (20 kft) with nominal CO (~125 ppbv). On ascent, ozone and CO were positively correlated below 27 kft peaking at 25 kft (O3 210 ppbv; CO 140 ppbv) with a nonvolatile CN fraction of about 0.5. Air looked more stratospheric at 33 kft (O3 250 ppbv; CO 75 ppbv), however the nonvolatile CN fraction increased to 0.8 suggesting some pollution influence must have been present. The initial descent to the 1 kft revealed several thin layers of aerosol and high CO (250-300 ppbv) clearly separated from the polluted boundary layer (O3 80 ppbv; CO 200 ppbv). Based on later profiling and DIAL images, these thin layers associated with the smoke plume from the fires in Alaska and western Canada persisted above the boundary layer along the full north-south extent of the flight track and were repeatedly sampled. To the north, boundary layer CO continued to be elevated (~200 ppbv), but ozone was much lower in the range of 40-60 ppbv. To the north, air in the free troposphere often appeared to represent a mixture of stratospheric and polluted air with ozone and CO both around 100 ppbv and nonvolatile CN fractions of 0.5 or more. A final leg at 1 kft heading into Pease was highly polluted with O3 reaching 110 ppbv and CO up to 300 ppbv. It appeared to be well aged with 50-100 pptv of NO, 2 ppbv of HNO3, 6-7 ppbv of CH2O, 2 ppbv H2O2, and ~6 ug/cm3 of sulfate.

The intercomparison with the NOAA WP-3D was conducted as planned and lasted approximately 45 minutes (1445-1530 UTC). This was followed by the rendezvous with the J-31 which included a BL leg terminating at the position of the Ron Brown followed by a spiral under the Terra satellite. Skies were clear, but the timing of the spiral was initiated about 20 minutes later than planned (1559 UTC).

The navigational data are available at URL: http://www.dfrc.nasa.gov/Research/AirSci/DC-8/ICATS/index.html

DC-8 NASA 817 INTEX 22 JUL 04



DC-8 NASA 817 INTEX 22 July 04

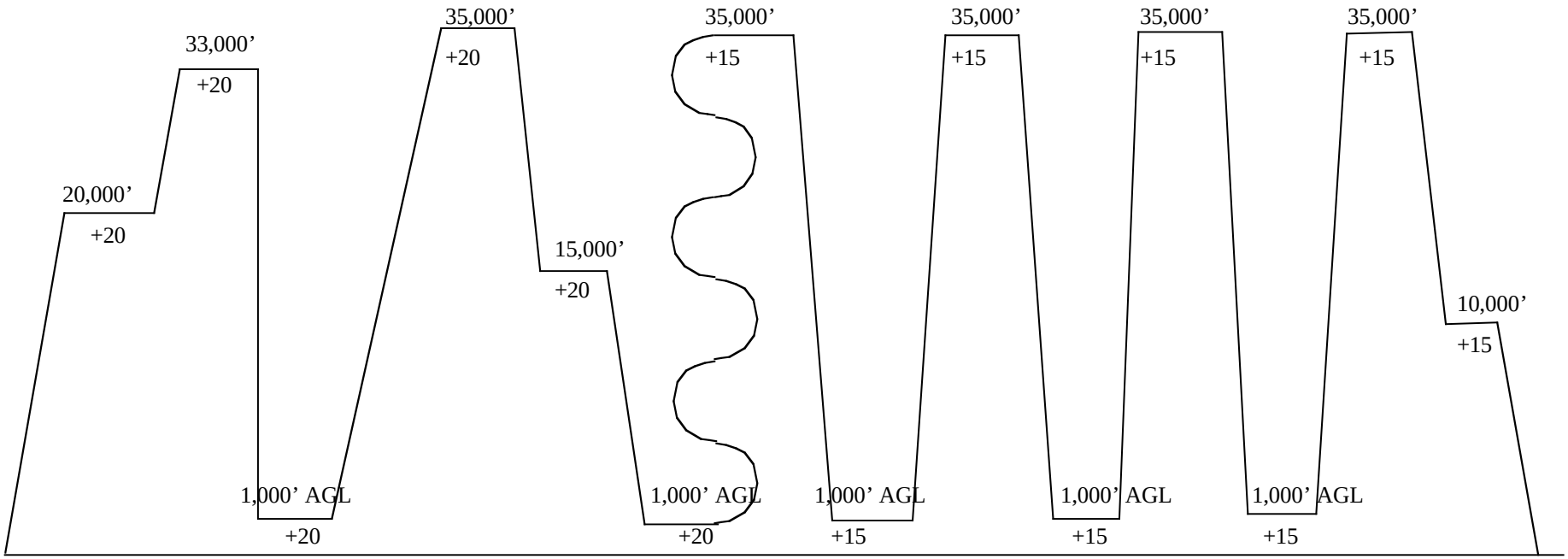
SPIRAL CLIMBS

to 10,000 msl @1,000 fpm

then 1500 fpm

ALL ENROUTE CLIMBS/DESCENTS

1500 FPM



PSM PT7 LACKS PT10 PT14 YGP PSM

TYPE ACFT	CALL SIGN	DATE	FROM	TO	PLND TO	ACT TO	PILOT	COPILOT
DC-8	NASA817		PEASE INTL TR N 43 05.5 W070 50.0	PEASE INTL TR N 43 04.7 W070 49.4	11:45			

TOT DIST	TOT TIME	FUEL REQ	NAVIGATOR	ENGINEER
2647.1	08+55	91141		

TP DTD#	Fix/Point Description	FREQ	Latitude Longitude	Alt Mind	TAS GS	TC MC	LEG DIST DIST REM	LEG TIME TIME REM	ETA	RETA	ATA	REMARKS
1	KPSM 16/RW PEASE INTL TR		N 43 05.5 W070 50.0	94M		149 165	0.0 2647	00+00 08+55	11:45			
2	LWM/E LAWRENCE	072X 112.50	N 42 44.4 W071 05.7	8811M	N/A N/A	209 225	24.0 2623	00+04 08+51	11:49			
3	PVD/R PROVIDENCE	103X 115.60	N 41 43.5 W071 25.8	20000M	330 330	194 209	62.7 2560	00+11 08+39	12:01			
4	ANNGO/W ANNGO		N 39 13.1 W072 08.9	20000M	330 330	192 207	153.8 2407	00+28 08+11	12:29			
5	LYNUS/W LYNUS		N 38 00.9 W072 39.2	20000M	330 330	198 212	76.0 2331	00+14 07+57	12:43			
6	ZIBUT/W ZIBUT		N 36 56.3 W072 40.0	20000M	330 330	181 194	64.5 2266	00+12 07+46	12:54			
7	.PT07		N 35 00.0 W074 00.0	20000M	330 330	209 222	133.1 2133	00+24 07+21	13:19			
8	CHAMP/W CHAMP		N 37 31.0 W071 41.0	20000M	330 330	037 049	188.1 1945	00+34 06+47	13:53			
9	LACKS/W LACKS		N 40 00.0 W068 12.0	20000M	330 330	048 063	221.1 1724	00+40 06+07	14:33			
10	.PT10		N 43 00.0 W069 00.0	20000M	250 250	349 005	183.5 1540	00+44 05+23	15:17			
	.delay		N 43 00.0 W069 00.0	20000M	250 250	349 006	0.0 1540	00+35 04+48	15:52			
11	YSJ59/W YSJ/E277059	082X 113.50	N 45 09.7 W067 13.2	20000M	330 330	031 048	150.8 1390	00+27 04+21	16:19			
12	OLESU/W OLESU		N 48 12.0 W063 15.8	20000M	330 330	042 062	244.9 1145	00+45 03+36	17:04			
13	VERTU/W VERTU		N 51 30.3 W059 45.4	20000M	330 330	034 056	240.6 904	00+44 02+52	17:48			

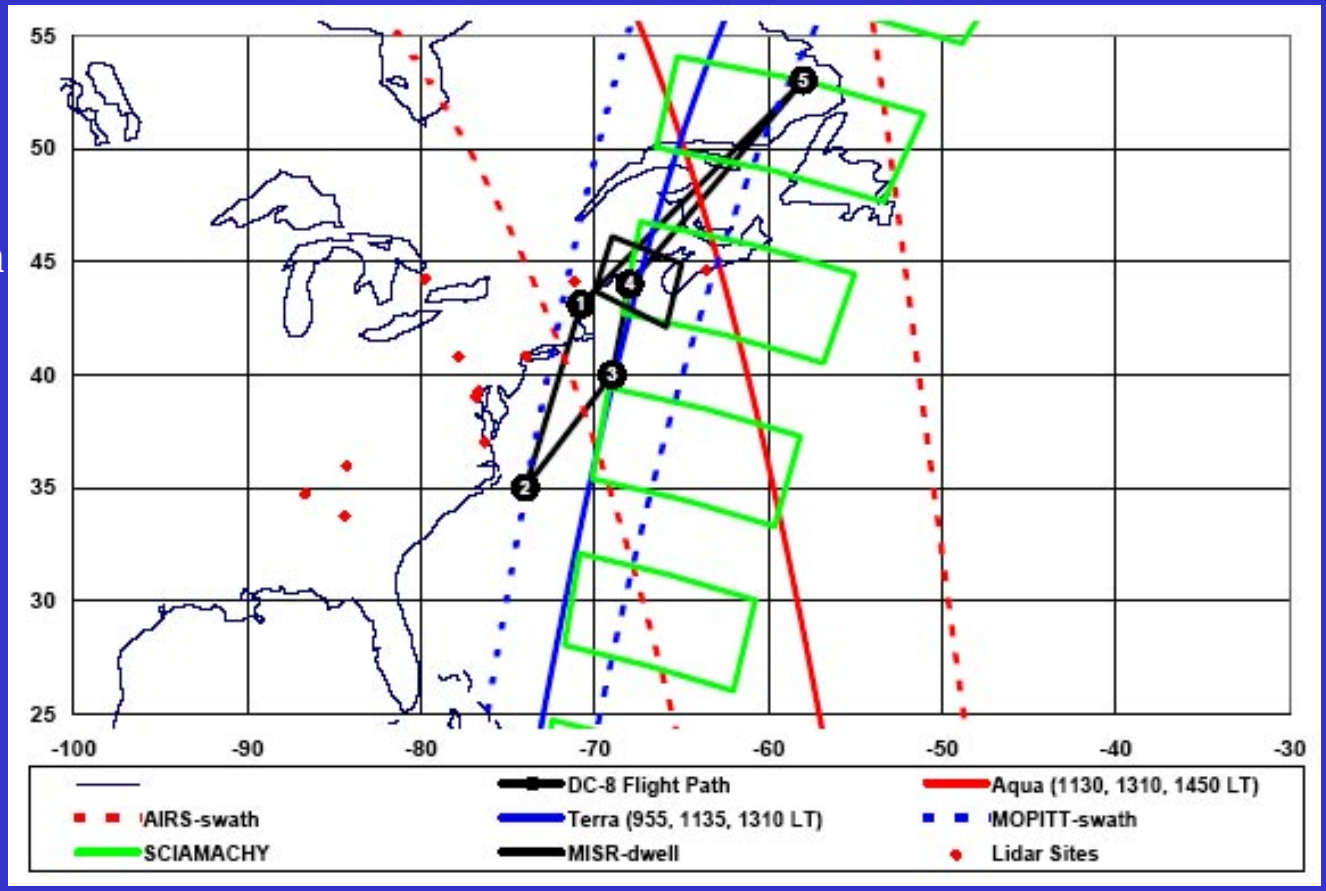
TP	Fix/Point	FREQ	Latitude	Alt	TAS	TC	LEG DIST	LEG TIME	ETA	RETA	ATA	REMARKS

DTD#	Description		Longitude	Wind	GS	MC	DIST REM	TIME REM				
14	.PT14		N 53 00.0 W058 00.0	20000M	330 330	036 059	110.8 793	00+20 02+32	18:08			
15	KONCH/W KONCH		N 51 48.0 W060 13.0	20000M	330 330	228 252	108.8 685	00+20 02+12	18:28			
16	YGP/W YGP/E	101X 115.40	N 48 45.8 W064 24.3	20000M	330 330	221 244	243.3 441	00+44 01+28	19:12			
17	SBGSK/W (SBGSK)		N 46 00.6 W067 46.9	20000M	330 330	220 240	215.0 226	00+39 +49	19:51			
18	EPDEY/W EPDEY		N 43 14.5 W070 57.5	20000M	330 330	219 237	214.7 11	00+39 +10	20:30			
19	KPSM/A PEASE INTL TR		N 43 04.7 W070 49.4	100M		149 165	11.5 0	00+10 +00	20:40			

INTEX flight#11 plan – Pease local 3 on 7/22

plan last updated 7/20 @20Z

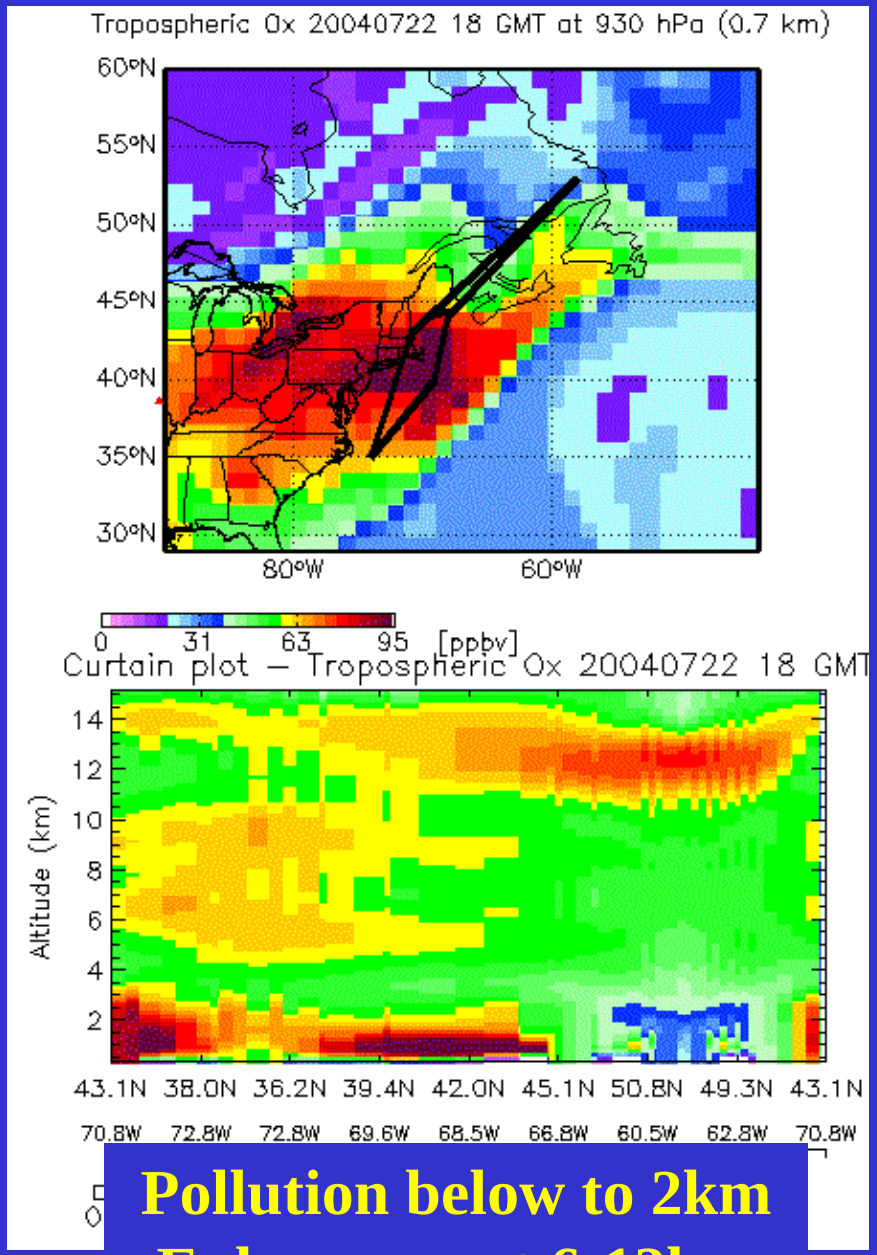
Take off 8 am
Flight time 9 h



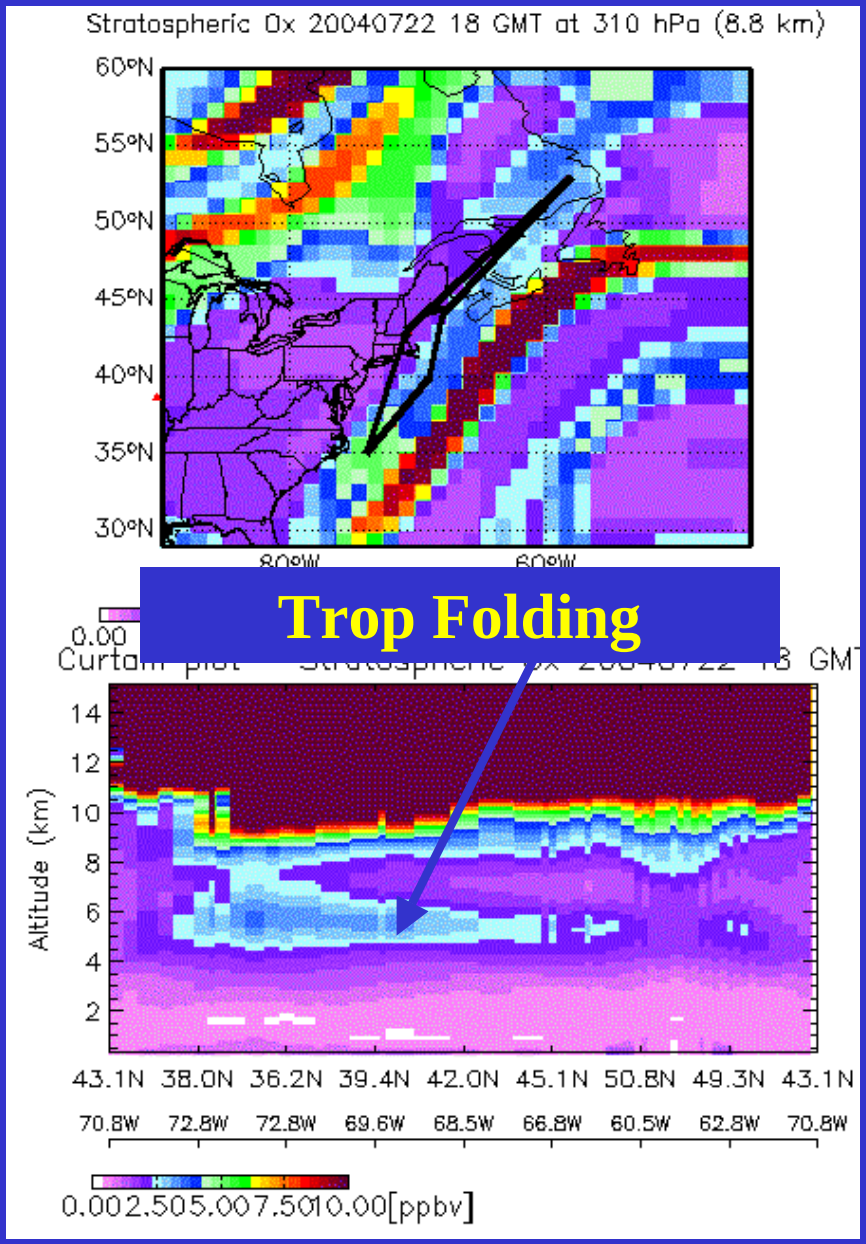
Objectives:

1. U.S. outflow to Atlantic (both in BL and FT)
2. Stratospheric, biomass burning, Asian, convective influences in FT
3. NOAA P-3 intercomparison (segment 3-4)
4. Terra transect (segment 2-4), and validation (pt. 4) together with J-31

GEOS 7/19 12Z forecasts for Thursday



Pollution below to 2km
Enhancement 6-12km



Trop Folding